Appendix B - DCS IMPROVED TEST TRANSMITTER

The DCS Improved Test Transmitter (ITT) is a self-timed DCPRS located within the Command & Data Acquisition (CDA) Station at Wallops. The TT differs from other platforms because it can transmit on any channel (1-233) through either spacecraft (EAST or WEST) and at any time. Transmissions can be controlled by the operator at the CDA (LOCAL mode), or by the DCS/DAPS (REMOTE mode). Data Transmitted by the TT is internally programmed and is formatted like any DCPRS. The message itself consists of its own address (15C94F4E), a canned message of 59 ASCII characters, and one or more EOT characters. The ITT is capable of supporting 100 bps, 300 bps or 1200 bps.   Also the ITT can be used for blocking a DCS channel and can have ad hoc ASCII message data received via the DAPS output to the satellite.

The ITT is intended primarily for routine (continuous), automated testing of the DCS channels, without interfering with the normal scheduled DCS operation. This continuous testing makes it possible to quickly detect failures in the spacecraft or in the demodulator ground equipment. Further, a record of such tests (which includes results of a bit-by-bit check of the "canned" message) provides the operator valuable channel status information when DCPRS failures are being investigated.

The Interface Control Document for the ITT is provided below.

INTERFACE CONTROL DOCUMENT FOR THE
DAPS TO IMPROVED TEST TRANSMITTER

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F I N A L

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Prepared For:
U.S. Department of Commerce
NOAA/NESDIS
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LIST OF ACRONYMS

ASCII   American Standard Code for Information Interchange

bps   bits per second

DAPS   Data Collection System Automatic Processing System

DCE   Data Circuit-Terminating Equipment

DCP   Data Collection Platform

DCS   Data Collection System

DTE   Data Terminal Equipment

EOT   ASCII character (End of Transmission)

GOES   Geostationary Operational Environmental Satellite

ICD   Interface Control Document

LSB   Least Significant Bit

NESDIS   National Environmental Satellite, Data, and   Information System

ITT   Improved Test Transmitter

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INTRODUCTION

Background

The National Environmental Satellite, Data, and Information Service (NESDIS) manages and operates the U. S. Geostationary Operational Environmental Satellite (GOES) system. One mission of the GOES system is to support the Data Collection System (DCS). The DCS gathers point source environmental data from Data Collection Platforms (DCP) via GOES link. The DCP data is processed in the Data Collection System Automatic Processing System (DAPS) at Wallops Station, Virginia and distributed to system users.

DAPS / Improved Test Transmitter

The DAPS sends commands to the improved Test Transmitter (TEST XMTR). In the DAPS the TEST XMTR can be commanded by either DAPS A or DAPS B computers via the Fallback Switching System. This interface control document (ICD) establishes the interface requirements between the TEST XMTR and the DAPS.

SCOPE

This ICD defines the design and performance requirements for the Test Transmitter/DAPS interface.

APPLICABLE DOCUMENTS

The following document(s) form a part of this specification. In the event of a conflict between the referenced document and this specification, the content of this specification shall take precedence.

Government Documents

None.

Non-Government Documents

Standards   Interface Between Data Terminal Equipment and EIA RS-232C Data Communication
                   Equipment Employing Serial Binary Data Interchange, June, 1981

ELECTRICAL SPECIFICATION REQUIREMENTS

General

The TEST XMTR/DAPS interface shall consist of an EIA Standard RS-232C asynchronous interface. Electrical characteristics such as voltage levels, input and output impedances, and driver slew rate shall meet the EIS Standard RS-232C requirements. The signal lines are defined below.

Bit Rate - The TEST XMTR/DAPS interface shall operate at 9600 bps.

Character Length - The character length shall be eight bits.

Stop Bit - Each character transfer across the interface shall contain one stop bit.

Parity - Each character transfer across the interface shall contain a parity bit (odd).

Signal Lines

Definition

The TEST XMTR is defined as the data circuit-terminating equipment (DCE) per the EIA RS-232C standard. The DAPS is defined as the data terminal equipment (DTE). The TEST XMTR/DAPS interface shall contain the following signal lines:

DESCRIPTION	RS-232C CIRCUIT
Protective Ground	AA
Signal Ground	AB
Transmitted Data	BA
Received Data	BB[*]
Request to Send	CA
Clear to Send	CB
Data Carrier Detect	CF
Data Terminal Ready	CD
Data Set Ready	CC

[*] Not a present requirement

Functional Description

The functional description of each signal line is listed in the Table below.

TEST XMTR/DAPS INTERFACE

```
┌──────────┐    PROTECTIVE GROUND    ┌──────────┐
│          │────────────────────────│          │
│  TEST    │    SIGNAL GROUND        │  DAPS    │
│  XMTR    │────────────────────────│          │
│          │◄───TRANSMITTED DATA─────│ FALLBACK │
│          │     RECEIVED DATA*      │ SWITCH   │
│          │────────────────────────►
│      RTS │◄───REQUEST TO SEND──────│          │
│      CTS │    CLEAR TO SEND        │          │
│          │────────────────────────►          │
│      DTR │◄───DATA TERMINAL READY──│          │
│      DSR │    DATA SET READY       │          │
│          │────────────────────────►          │
│      DCD │    DATA CARRIER DETECT  │          │
│          │────────────────────────►          │
└──────────┘                         └──────────┘
```
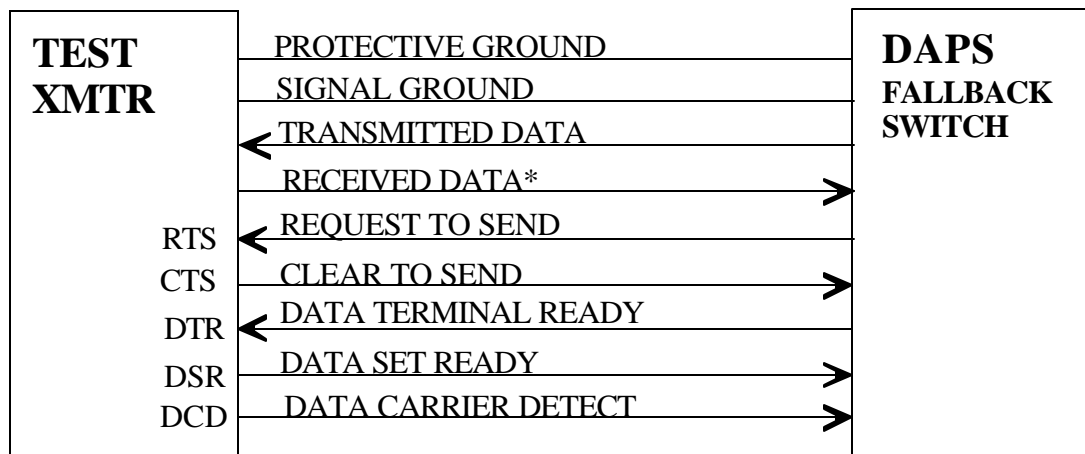
* Not a Present Requirement

RS-232C SIGNAL LINE DESCRIPTION

SIGNAL	SOURCE	FUNCTION
Protective Ground	_____	Chassis Ground
Signal Ground	_____	Ground Reference point relative to all other RS-232 signals (Except protective ground).
Transmitted Data	DAPS	Command data to Test XMTR.
Received Data	TEST XMTR	Not present requirement
Request to Send	DAPS	Control signal indicating ready to send.
Clear to Send	TEST XMTR	Control signal indicating to ready to receive data.
Data Carrier Detect	TEST XMTR	Ready to receive data.
Data Terminal Ready (DTR)	DAPS	Indicates ready condition of DAPS to transmit data. When "ON", DAPS is powered up and set up to command.
Data Set Ready (DSR)	TEST XMTR	Indicates status condition of the TEST XMTR. DSR will go to "ON" after DTR "ON" state is recognized and TEST XMTR is ready to receive commands.

MECHANICAL SPECIFICATION REQUIREMENTS

Connectors

The panel connector on the TEST XMTR for the RS-232C interface shall be a DB-25-S (female) type

connector. The panel connector on the DAPS (Fallback Switching System) shall be a DB-25-P (male) type connector.

Pin Designation

The pinout for the TEST XMTR/DAPS interface shall be as defined as shown in the Table.

Cable

The type and length of the cable for the TEST XMTR/DAPS interface shall be customer specified.

PIN DESIGNATION

SIGNAL	TEST XMTR CONNECTOR PIN NO.	DAPS CONNECTOR PIN NO.
Protective Ground	1 _____	1
Signal Ground	7 _____	7
Transmitted Data	2 _____	2
Received Data	3 _____	3
Request to Send	4 _____	4
Clear to Send	5 _____	5
Data Set Ready	6 _____	6
Data Terminal Ready	20 _____	20
Data Carrier Detect	8 _____	8

DATA DEFINITION

The DAPS sends command information to the TEST XMTR that defines the parameters for the next transmission.

DAPS to TEST XMTR Command Data

There shall be three types of commands from the DAPS to the TEST XMTR: normal transmit, jam transmit and abort commands.

Normal Transmit Command

The normal transmit command defines the destination, transmission type, timing, and the message data contents of the next transmission. The normal transmit command data block format is shown in the Figure below. Each data block shall contain two words of synchronization, a command definition word, transmit

channel number word, two words that define the TEST XMTR address, a word that specifies the length of the message data, and the message data itself.

TRANSMIT COMMAND DATA FORMAT

16   1

SYNC
SYNC
COMMAND
TRANSMITTER ADDRESS BITS 1-16
TRANSMITTER ADDRESS BITS 17-31
NUMBER OF MESSAGE DATA WORDS
MESSAGE DATA (NORMAL TRANSMISSION MODE)

SYNC WORD = TWO (2) ASCII "SYN" Characters = 00010110 00010110 LSB

Command Word

The command word is defined in the Figure below. Command type bits 16 and 15 designate the block transfer as a normal transmit command.

Bits 14 and 13 specify the spacecraft to be used for the test transmission.   Bits 12, 11, and 10 define the transmission bit rate. Bit 9 specifies the transmission preamble length.

COMMAND WORD

CMD TYPE	S/C SEL	DATE RATE	PRE- AMBLE	X	X	X	X	X	X	X	X

Bit   16   15   14   13   12 11 10   9   8   7   6   5   4   3   2   1   First
                                                                                      Bit
                                                                                 Transmitted

DESCRIPTION   BIT/VALUE   DEFINITION
COMMAND TYPE   16/15

0 0		NOT USED
0 1		NORMAL TRANSMIT COMMAND
1 0		JAM TRANSMIT COMMAND
1 1		ABORT COMMAND

SPACECRAFT SELECT	14/13	
	0 0	NOT USED
	0 1	EAST SPACECRAFT
	1 0	WEST SPACECRAFT
	1 1	BOTH EAST AND WEST SPACECRAFT

DATA RATE	12/11/10	
	0 0 0	100 BPS
	0 0 1	300 BPS
	0 1 0	1200 BPS

(Remaining States Undefined)

PREAMBLE	9	
	0	SHORT PREAMBLE TRANSMISSION
	1	LONG PREAMBLE TRANSMISSION

Channel Number Word

The channel number word shall specify the transmit channel number (value: $1\text{-}266_{10}$ expressed in binary format, bit 1 = LSB).

Transmitter Address Words

Two words shall specify the 31-bit binary address of the TEST XMTR (bit 1 = LSB).

Number of Message Data Words

This word shall specify the number of message data words (16 bits) in the transmit command data block format. The number shall be a binary number with bit 1 = LSB.

Message Data

The message data shall consist of a specified number of words of 7-bit ASCII or 8-bit binary data.

Jam Transmit Command

The jam transmit command to the TEST XMTR shall start a transmission of continuous carrier (no data). The abort command shall terminate the carrier transmission. The jam transmit command data block is shown in the above Figure. However, there shall be no message data associated with the jam transmit command. The length of the message data word shall have a value of binary zero.

Abort Command

The DAPS to TEST XMTR abort command shall terminate any ongoing and/or pending transmissions. The abort command data block format is provided below. Each data block shall contain two words of synchronization followed by the abort command word defined in the second figure shown below. Bits 16 and 15 designate the command as an abort command.

ABORT COMMAND DATA FORMAT

WORD = 16 bits

SYNC
SYNC
ABORT COMMAND

SYNC WORD = Two ASCII "SYN" Characters = 00010110 00010110 LSB

ABORT COMMAND WORD

CMD TYPE	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Bit   16   15   14   13   12   11   10   9   8   7   6   5   4   3   2   1 First

    Bit

    Transferred

DESCRIPTION	BIT/VALUE		DEFINITION
COMMAND TYPE	16/15		
	0	0	NOT USED
	0	1	NORMAL TRANSMIT COMMAND

B-12

1	0	JAM TRANSMIT COMMAND
1	1	ABORT COMMAND